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OSWER Docket
Environmental Protection Agency
Mailcode: 5305-G
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Attention Docket ID No. RCRA-2002-033

Re: Comments on Draft Subsurface Vapor Intrusion Guidance
Docket ID No. RCRA-2002-033

Dear Sirs:

We are pleased to provide comments on the U.S. Environmental Protection Agency's (EPA) November 2002 Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Draft Guidance). Our comments are based on our recent experience in applying the Draft Guidance to an extensive and comprehensive on-going study of the vapor intrusion pathway that we began before the release of the Draft Guidance.

As part of our investigation of the Coliseum Boulevard Plume site in Montgomery, Alabama, we designed and have been implementing a study to determine whether trichloroethene (TCE) and/or its degradation products have impacted, or have the potential to impact, air quality. Much of the area underlain by the TCE plume is residential, with either slab-on-grade or crawl space construction. The depth to groundwater ranges from eight to 24 feet below ground surface. The unsaturated soils are comprised of sand and an overlying sandy clay. Except for a very limited area where the sandy clay is very thin (less than 0.5 foot), the sandy clay unit ranges from two to greater than six feet in thickness across the study area. Our study includes the collection of background ambient air samples, ambient air samples in the yards of the investigated properties, shallow soil gas samples from temporary soil probes installed under the residences of the investigated properties, and, where applicable, samples of crawlspace air. Twenty-four-hour samples are collected and analyzed using EPA Method TO-14A/15 to satisfy data quality objectives established for the project. Appropriate quality assurance/quality control samples are also collected and analyzed. To date, 30 properties have been investigated during two rounds of sampling. A third round of sampling is currently on going with results expected in mid-April.

We recognize that the Draft Guidance is a screening-level tool to aid in determining whether a vapor intrusion pathway is complete and whether a completed pathway poses an unacceptable risk to human health. We recognize and appreciate that the Draft Guidance provides an exit strategy where the vapor intrusion pathway is incomplete. Based on our recent experience, however, we find it necessary to comment on the following:

- The generic attenuation factors for soil gas used in the Tier 2 screening and Tier 3 site-specific assessment,

- The semi-site-specific attenuation factors for soil gas used in the Tier 2

screening and site-specific assessment,

- The decision criteria in the Tier 3 site-specific assessment
- The analytical detection limits and costs for soil gas and air samples, and
- The significance of the provisional toxicological criteria for TCE in the screening-level evaluation.

Generic Attenuation Factors for Soil Gas

The generic attenuation factors used to derive the target soil gas concentrations for shallow (< 5 feet below foundation level) and deep (> 5 feet below foundation level) soil gas in Tables 2(a), 2(b), and 2(c) are overly conservative. The generic attenuation factor for shallow soil gas (0.1) is based on a subset of empirical data from residences at one site where corresponding sub-slab and indoor air samples were collected. Based on review of page F-18 in the Guidance Document, we question the development of soil gas to indoor air attenuation factors based on one site. Information on the construction of the residences (whether of similar or varied construction) in the data set and whether that construction is representative of the range of residential construction likely to be encountered elsewhere (or the construction typically assumed as the default in vapor intrusion models) should be provided. This attenuation factor (0.1) is then conservatively assumed to apply to all shallow soil gas samples to a depth of 5 feet below foundation level. Such an assumption fails to take into account the variety of shallow soil types and geotechnical conditions and the attenuation provided by the less permeable soils. A generic attenuation factor for deep soil gas (0.01) is not supported. Such an assumption also fails to take into account the variety of deeper soil types and geotechnical conditions and the attenuation provided by deeper and less permeable soils. Further, the definition of shallow versus deep soil gas samples seems to be inflexible when it should be based on the soil type present at each site. We recommend that the vapor intrusion database be further developed and used to derive generic attenuation factors for shallow and deep soil gas.

Semi-Site-Specific Attenuation Factors for Soil Gas

The semi-site specific attenuation factors used to derive the target soil gas concentrations in Tables 3(a), 3(b), and 3(c) are overly conservative. Limiting the basis for the attenuation factors to only four soil types does not adequately consider the range of soil types that may be encountered, particularly soils less permeable to vapor flow (e.g., clays). As a result the range of semi-site-specific attenuation factors for soil gas span only one order of magnitude (from 2x10-3 to 2x10-4). Based on Table 4 in the Draft Guidance, the "loam" texture classification could include soil types with vapor permeabilities ranging over at least two orders of magnitude. As indicated in Appendix G of the Draft Guidance, soil air permeability is a key parameter, with moderate to high sensitivity, when evaluating or modeling the vapor intrusion pathway. We recommend that the semi-site-specific attenuation factor approach be expanded to consider soils less permeable to soil gas.

Further, it is recommended in the Draft Guidance that the graphs in Figure 3(a) and 3(b) not be used to evaluate soil gas samples collected at depths less than 5 feet. Again, the depth and soil type should be taken into consideration for development of these semi-site-specific attenuation factors, and a user should not be penalized for successful collection of "shallower" samples when site-specific conditions warrant.

Decision Criteria in the Tier 3, Site-Specific Assessment

Under the Tier 3 series of questions, a user is directed to collect indoor air samples if sub-slab soil gas samples exceed the screening levels in Tables 2(a), 2(b), or 2(c) without any account for soil type and sample depth. (See Question 6(e)) This decision does not allow the user to account for site-specific or semi-site-specific attenuation factors, but rather relies upon the generic attenuation factor. (See discussion above).

Analytical Detection Limits and Costs for Soil Gas and Air Samples

In Appendix A of the Draft Guidance, Table A-2 VOC Analytical Methods, their Detection Limits and Estimated Costs, presents information on the OAR TO-15 method for analyzing air samples collected in canisters for VOCs, using GC/MS. The average practical detection limits (PDLs) specified in the guidance for the method are shown as 0.2 to 0.5 micrograms/cubic meter (ug/m3) for the Scan mode and 0.02 ug/m3 for the SIM mode. The analyte list (target compound list) includes eight VOCs and the estimated analytical cost is shown as $250 per sample.

During our study, we implemented the TO-14A/15 analytical methods, in both Scan and SIM modes, on ambient air, soil gas, and crawlspace air samples. We worked with various laboratories to identify method detection limits (MDLs) for several target compounds, including TCE. Based on this experience, we offer the following comments on the TO-15 Method:

· The average PDLs shown in Table A-2 of the guidance document are very low for GC/MS based analyses. Using TCE as an example, the PDLs are 0.2 to 0.5 ug/m3 (0.036 to 0.090 parts per billion by volume (ppbv)) in Scan mode and 0.02 ug/m3 (0.004 ppbv) in SIM mode. Commercial air laboratories that we surveyed and have been using have identified MDLs for TCE of 0.15 to 0.50 ppbv in Scan mode and 0.02 to 0.14 ppbv in SIM mode. The order of magnitude difference in detection limits between those presented in the table and our survey is significant. We recommend that the PDLs in the table be reviewed and references footnoted. We recommend that a blind survey of at least 10 commercial air-testing laboratories be conducted to support any conclusions concerning PDLs.

· The analyte list reference for the TO-15 method is List 8, which includes over 50 VOCs. A novice in this field may incorrectly assume that since List 8 is the referenced analyte list or the target compound list for the method, it must be used. This would have a significant impact on project effort and costs. Often only a small number of VOCs of concern are present at a site, indicating that analysis of only limited target compound list is warranted. Such an approach is consistent with regulatory programs under which soil and groundwater contamination are investigated. Conversely, the VOCs of concern may not be on List 8. This would require expanding or modifying List 8, as applicable, to include other VOCs not typically requested. Since the data quality objectives for the project will drive the selection of the target compound list and the analytical requirements, we recommend Appendix A-2 note that List 8 (and also the analyte lists for other methods in the appendix) is not a requirement and may be reduced or increased to address site-specific/project needs.

· The estimated analytical cost is shown as $250 per sample. The table does not specify the basis for this cost (i.e., entire analyte list, Scan or SIM mode, deliverable package, or turnaround time). Our experience has shown that the analytical cost for Method TO-14A/15 is dependant on the analytical mode and the target compound list. Typically, Scan mode costs from $200-250 and SIM mode costs $250-350 for several VOCs, with a standard two-week turnaround and comprehensive data package that can undergo validation. However, the cost does not increase significantly for an expanded or full target compound list. We recommend that the costs presented in the table reflect Scan versus Sim modes and that a footnote be added noting that the project-specific target compound list

and other factors will affect costs. It also should be noted that the costs presented in Table A-2 do not include the rental of equipment for sample collection which generally is provided by the laboratory. Based on our experience, the shipping cost and analytical cost to certify the canisters and flow controllers are clean increases the total sampling cost by $500 to $600 per sample.

· We recommend that Appendix A-2 note that the air methods may be used for soil gas testing.

Significance of the Provisional Toxicological Criteria for TCE

Recently, the EPA reviewed the potential carcinogenic risks associated with TCE and issued a draft document for external review and public comment entitled, "Trichloroethylene Health Risk Assessment: Synthesis and Characterization." In this assessment, the EPA revised their previous conclusions regarding TCE carcinogenicity and concluded that TCE is substantially more potent than originally thought. The assessment describes risk estimates based on animal studies in mice and rats and human epidemiology studies reporting increased cancer rates at various sites. These studies have been cited as support for the conclusion that TCE exposure can cause cancer in humans. The assessment proposes that the risk falls in a range between 2x10-2 and 4x10-1 per mg/kg body weight-day. These values are up to 36 times greater than the oral cancer slope factor and up to 67 times greater than the inhalation cancer slope factor used previously by the EPA.

It is our understanding the EPA has received a considerable number of comments on the draft health risk assessment, is currently reevaluating the assessment based on the comments and newer studies, and may further revise the cancer slope factors. The draft health risk assessment is labeled " Do Not Cite or Quote." Nevertheless, the EPA used the upper bound cancer slope factor (i.e., the slope factor of 4x10-1 per mg/kg body weight-day) to derive the target indoor air concentrations in the Draft Guidance. We are concerned that this upper bound cancer slope factor is becoming a de facto value for regulatory use.

We support the development of a structured logic for early evolution of the potential for vapor intrusion, an approach that should be conservative to useful as a screening-level tool. However, our concern is that it is so conservative, particularly in the case of TCE, that the logic will dictate the collection of indoor air samples early in a study when such sampling may be unwarranted.

Thank you for the opportunity to provide our comments. Should you have questions, please feel free to contact me at 334-206-2270 or email at: coxb@dot.state.al.us

Very truly yours,

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